

Dr. Babula Jena, M. Sc, M. Phil, Ph. D
Scientist F, Section In-Charge, Polar Remote Sensing
National Centre for Polar and Ocean Research
Ministry of Earth Sciences, Government of India
Vaso-da-gama, Goa-403804

E-mail: babulajena@gmail.com
bjena@ncpor.res.in
Telephone: +91-9405334028
+91-832-2525638
URL: www.ncpor.res.in/profiles/details/98

Research/teaching interests: Satellite Oceanography

- In-situ and remote sensing applications for advance understanding of the polar sea-ice, ocean-ice-atmosphere interaction, ocean color, and marine phytoplankton blooms in a warming climate.
- Retrieval and validation of oceanic environmental products from satellite observations to monitor the physical and biological processes in the marine environment.
- Exploration of sea floor features using multibeam swath bathymetric survey and satellite altimetry.

Academic background

2001-2007: Ph.D (Marine Science) from Berhampur University/NRSC, ISRO. Thesis title: Studies on the retrieval, validation and applications of geophysical parameters from MSMR onboard Indian Remote Sensing Satellite (IRS P4).

1999-2001: M.Phil (Marine Science), Berhampur University, India.

1996-1998: M.Sc (Oceanography, Specialization: Remote Sensing), Berhampur University, India.

Peer-Reviewed Scientific Publications

- **Jena, B.**, Kshitija, S., Bajish, C. C., Turner, J., Holmes, C., Wilkinson, J., Rahul M, Thamban, M., (2024). Evolution of Antarctic sea ice ahead of the record low annual maximum extent in September 2023. *Geophysical Research Letters*, 51, e2023GL107561. <https://doi.org/10.1029/2023GL107561> (IF: 5.576).
- **Jena, B.**, Turner, J., Reeves-Francois, T., C.C. Bajish, Holmes, C., Caton Harrison, T., Phillips, T., Wang, Z., (2024). Occurrence of unusual extensive ice-free feature within the pack ice of the central Weddell Sea, Antarctica in December 1980. *Nature Portfolio Journal: Climate and Atmospheric Science*, 7 (152). <https://www.nature.com/articles/s41612-024-00700-7> (IF: 9.448).
- Kshitija, S., **Jena, B.**, Bajish, C.C. Anilkumar, N., (2023). Recent Decline in Antarctic Sea Ice Cover From 2016 to 2022: Insights from Satellite Observations, Argo Floats, and Model Reanalysis. *Tellus A: Dynamic Meteorology and Oceanography*, 75(1), p.193–212 (IF: 2.247).
- Turner, J., Holmes, C., Harrison T C., Phillips, T, **Jena, B.**, Francois, T. R, et al., (2022). Record low Antarctic sea ice cover in February 2022. *Geophysical Research Letters*, 49, e2022GL098904. DOI: 10.1029/2022GL098904 (IF: 5.576).
- **Jena, B.**, Bajish, C.C., Turner, J., Ravichandran, M., Anilkumar, N., Kshitija, S., (2022). Record low sea ice extent in the Weddell Sea, Antarctica in April/May 2019 driven by intense and explosive polar cyclones. *Nature Portfolio Journal: Climate and Atmospheric Science*, 5 (19), <https://www.nature.com/articles/s41612-022-00243-9> (IF: 9.448).

- **Jena, B.**, Bajish, C.C., Turner, J., Ravichandran, M., Kshitija, S., Anilkumar, N., et al. (2022). Mechanisms associated with the rapid decline in sea ice cover around a stranded ship in the Lazarev Sea, Antarctica. *Science of The Total Environment*, 821, 153379. <https://doi.org/10.1016/j.scitotenv.2022.153379> (IF: 10.753).
- Mishra, R. K., **Jena, B.**, Venkataramana, V., et al. (2022). Decadal changes in global phytoplankton compositions influenced by biogeochemical variables, *Environmental Research*, 206, <https://doi.org/10.1016/j.envres.2021.112546> (IF: 8.431).
- Bajish, C. C., **Jena, B.**, Anilkumar, N., (2021). Is the Indian monsoon rainfall linked to the Southern Ocean sea ice conditions? *Weather and Climate Extremes*, 34, 100377 (IF: 7.761).
- Anilkumar, N., **Jena, B.**, JV George., P. Sabu., S. Kshitija., M Ravichandran., (2021). Recent Freshening, Warming, and Contraction of the Antarctic Bottom Water in the Indian Sector of the Southern Ocean. *Frontiers In Marine Science* 8, DOI: 10.3389/fmars.2021.730630 (IF: 5.247).
- Anilkumar, N., Ravichandran, M., **Jena, B.**, (2020). Indian Scientific Expeditions to the Southern Ocean: Comprehensive surveys to understand atmospheric, physical, and biogeochemical processes. *Deep-Sea Research-II*, <https://doi.org/10.1016/j.dsr2.2020.104860> (IF: 2.887).
- Mishra, R.K., Naik, R.K., Vankara, V., **Jena, B.**, AnilKumar, N., Soares, M., Sarkar, A., et al., (2020). Phytoplankton biomass and community composition in the frontal zones of Southern Ocean. *Deep-Sea Research-II*, <https://doi.org/10.1016/j.dsr2.2020.104799> (IF: 2.887).
- Turner, J., Guarino, M. V., Arnatt, J., **Jena, B.**, Marshall, G., Phillips, T. et al., (2020). Recent decrease of summer sea ice in the Weddell Sea, Antarctica. *Geophysical Research Letters*, 47, e2020GL087127. <https://doi.org/10.1029/2020GL087127>. (IF: 5.576).
- **Jena, B.**, Anilkumar, N., (2020). Satellite observations of unprecedented phytoplankton blooms in the Maud Rise Polynya, Southern Ocean. *The Cryosphere*, 14, 1385-1358. <https://doi.org/10.5194/tc-14-1385-2020> (IF: 5.805).
- **Jena, B.**, Ravichandran, M., & Turner, J. (2019). Recent reoccurrence of large open-ocean polynya on the Maud Rise seamount. *Geophysical Research Letters*, 46, 4320–4329. <https://doi.org/10.1029/2018GL081482> (IF: 5.576).
- **Jena, B.**, Kumar, A., Ravichandran, M., Kern, S (2018) Mechanism of sea-ice expansion in the Indian Ocean sector of Antarctica: Insights from satellite observation and model reanalysis. *PLOS ONE* 13 (10): e0203222. <https://doi.org/10.1371/journal.pone.0203222>. (IF: 3.752).
- **Jena, B.**, (2018). Phytoplankton blooms in the Southern Ocean: Through satellite observations. *Geography and You*. <https://www.geographyandyou.com/phytoplankton-blooms-in-the-southern-ocean-through-satellite-observations/>
- Tripathy, S.C., **Jena, B.**, (2019). Iron-Stimulated Phytoplankton Blooms in the Southern Ocean: a Brief Review. *Remote Sensing of Earth System Sciences* (Springer), 2, 64–77 (2019). <https://doi.org/10.1007/s41976-019-00012-y>.
- **Jena, B** (2017), Effect of phytoplankton pigment composition and packaging on the retrieval of chlorophyll-a concentration from satellite observations in the Indian sector of Southern Ocean. *International Journal of Remote sensing* (Taylor & Francis), 38 (13), 3763-3784, ISSN: 1366-5901, doi: 10.1080/01431161.2017 (IF: 3.531).
- Shetye, S., **Jena, B.**, Mohan, R., (2017), Dynamics of sea-ice biogeochemistry in the coastal Antarctica during transition from summer to winter. *Geoscience Frontiers (Elsevier)*, 8 (3), 507-516. ISSN: 1674-9871, doi: <http://dx.doi.org/10.1016/j.gsf.2016.05.002> (IF: 7.483).
- Mishra, R.K., **Jena, B.**, Anilkumar, N., Sinha, R.K., (2017). Shifting of phytoplankton community in the frontal regions of Indian Ocean sector of the Southern Ocean using in situ and satellite data. *Journal of Applied Remote Sensing (SPIE)*, 11 (1), doi: 10.1117/1.JRS.11.016019. (IF: 1.568).

- Mishra, R.K., **Jena, B.**, Anilkumar, N., Krishna NR, Bhaskar, P.V., (2017). Variability of chlorophyll-a and diatoms in the frontal ecosystem of Indian Ocean sector of the Southern Ocean. *Polish Polar Research*, 38 (3), 375-392, ISSN: 2081-8262, doi: 10.1515/popore-2017-0014 (IF: 0.900).
- Sasmal, S. K., **Jena, B.**, (2016), Monitoring of ocean environmental changes under influence of cyclonic system: Utilization of SARAL and contemporary satellite observations. *Remote Sensing Applications: Society and Environment (Elsevier)*. ISSN: 2352-9385, doi: 10.1016/j.rsase.2016.10.003.
- **Jena, B.**, Kurian, P.J., Kumar, A (2016), Morphology of submarine channel-levee systems in the eastern Bay of Bengal near Andaman region. *Journal of Coastal Conservation (Springer)*, 20 (3), 211–220, ISSN: 1874-7841, doi:10.1007/s11852-016-0431-2 (IF: 2.098).
- **Jena, B** (2016), Satellite remote sensing of Island mass effect on the sub-Antarctic Kerguelen Plateau, Southern Ocean. *Frontiers of Earth Science (Springer)*, 10 (3), 479–486. ISSN: 2095-0209, doi: 10.1007/s11707-016-0561-8 (IF: 2.273).
- Shetye, S., Mohan, R., Patil, S., **Jena, B.**, Chacko, R., George, J.V., Noronha, S., Singh, N., Priya, L., Sudhakar, M. (2015), Oceanic pCO₂ in the Indian sector of the Southern Ocean during the austral summer–winter transition phase. *Deep-Sea Research-II (Elsevier)*, 118, 250–260. ISSN: 0967-0645, doi: <http://dx.doi.org/10.1016/j.dsr2.2015.05.017> (IF: 2.887).
- Shetye, S., Sudhakar, M., Mohan, R., **Jena, B.**, (2014), Contrasting Productivity and Redox Potential in Arabian Sea and Bay of Bengal. *Journal of Earth Science, (Springer)*, 25 (2), 366–370. ISSN: 1867-111X, doi: 10.1007/s12583-014-0415-9 (IF: 2.433).
- Shetye, S., Sudhakar, M., **Jena, B.**, Mohan, R. (2013), Occurrence of Nitrogen Fixing Cyanobacterium Trichodesmium under Elevated pCO₂ Conditions in the Western Bay of Bengal. *International Journal of Oceanography (Hindawi)*, ArticleID-350465, 8pages, ISSN: 1687-9406, doi: <http://dx.doi.org/10.1155/2013/350465>.
- Rajendran, C. P., Andrade, V., Jaishri, S, Kurian, J., **Jena, B.**, (2013), Constraining large earthquakes along the Andaman trench using deepwater turbidites: prospects and challenges. *Current Science*, 104 (10), 1300-1307. ISSN: 0011-3891 (IF: 1.169).
- Kumar, A., **Jena, B.**, Vinaya, M.S., Jayappa, K.S., Narayana, A.C., Bhat, G.H., (2012), Regionally tuned algorithm to study the seasonal variation of suspended sediment concentration using IRS-P4 Ocean Colour Monitor data. *The Egyptian Journal of Remote Sensing and Space Sciences (Elsevier)*, 15, 67–81. ISSN: 1110-9823, doi: <http://dx.doi.org/10.1016/j.ejrs.2012.05.003> (IF: 6.393).
- **Jena, B.**, Sahu, S., Kumar, A., Swain, D., (2013), Observation of oligotrophic gyre variability in the south Indian Ocean: Environmental forcing and biological response. *Deep-Sea Research-I (Elsevier)*, 80, 1-10. ISSN: 0967-0637, doi: 10.1016/j.dsr.2013.06.002 (IF: 3.101).
- **Jena, B.**, Kurian, P.J., Swain, D., Tyagi, A., Ravindra, R., (2012), Prediction of bathymetry from satellite altimeter based gravity in the Arabian Sea: Mapping of two unnamed deep seamounts. *International Journal of Applied Earth Observation and Geoinformation (Elsevier)*, 16, 1–4. ISSN: 0303-2434, doi: 10.1016/j.jag.2011.11.008 (IF: 7.672).
- **Jena, B.**, Swain, D., Kumar, A., (2012), Investigation of the biophysical processes over the oligotrophic waters of South Indian Ocean subtropical gyre triggered by cyclone Edzani. *International Journal of Applied Earth Observation and Geoinformation (Elsevier)*, 18, 49–56. ISSN: 0303-2434, doi: 10.1016/j.jag.2012.01.006 (IF: 7.672).
- **Jena, B.**, Rao, M. V., Sahu, S., Sahu, B. K., (2011), A comparative assessment of IRS-P4 (MSMR) derived sea surface temperature and sea surface wind speed over the north Indian Ocean. *International Journal of Remote sensing (Taylor & Francis)*, 32 (24), 9879-9891, ISSN: 1366-5901, doi: 10.1080/01431161.2011.562932 (IF: 3.531).

- **Jena, B.**, Swain, D., Tyagi, A., (2010), Application of artificial neural networks for sea surface wind speed retrieval from IRS-P4 (MSMR) brightness temperature. *IEEE Geoscience and Remote Sensing Letters, IEEE (GSRL)*, 7 (3), 567-571, ISSN: 1545-598X, doi:10.1109/LGRS.2010.2041632 (**IF: 5.343**).
- **Jena, B.**, Rao, M.V., Sahu, B. K., (2006), TRMM derived sea surface temperature in the wake of a cyclonic storm over the central Bay of Bengal. *International Journal of Remote sensing (Taylor & Francis)*, 27 (14), ISSN: 1366-5901, 3065–3072, doi: 10.1080/01431160600589187 (**IF: 3.531**).
- **Jena, B.**, S. K. Sasmal, M. V. Rao, M. M. Ali (2006), Inter comparison of NOAA-AVHRR and IRS-P4 (MSMR) derived Sea Surface Temperatures: Possibility of blending two observations. *International Journal of Remote sensing (Taylor & Francis)*, 27 (15), 3123–3130, ISSN: 1366-5901, doi: 10.1080/01431160600580608 (**IF: 3.531**).
- Choudhury, S. B., **Jena, B.**, M. V. Rao, K. H. Rao, V. S. Somvanshi, D. K. Gulati and S. K. Sahu (2007), Validation of integrated potential fishing zone forecast using satellite based chlorophyll and sea surface temperature along the east coast of India. *International Journal of Remote sensing (Taylor & Francis)*, 28 (12), 2683 – 2693, ISSN: 1366-5901, doi: 10.1080/01431160600987878 (**IF: 3.531**).
- **Jena, B.**, Sudarshana, R., Chaudhary, S. B., (2003), A study on spatial distribution of water quality parameters around the Sagar Island, Sunderbans. *J. Nature Env. and pollu. Tech.*, 2 (3), 329-332, ISSN: 0972-6268.
- **Jena, B.**, Sudarshana, R., Chaudhary, S. B., (2003), An environmental inventory of Sagar Island using IRS-1C LISS-III data. *J. Nature Env. and pollu. Tech.*, Vol.2 (4), 405-409, ISSN: 0972-6268.

Editorial Board

- Guest Editor, Deep-Sea Research-II (Elsevier)
- Associate Editor, Remote Sensing in Earth System Sciences (Springer)
- Journal of Water Resources and Ocean Science.

Awards/Honours

- Received Ministry of Earth Science (Government of India) Award: Merit Scientist for the year 2020 for outstanding contribution in the field of Polar Science and Technology.
- Fellowship awarded by National Remote Sensing Centre, ISRO, during 2001-2005.

Scientific expeditions for National/International programmes

2010: Dy. Chief Scientist in Akademik Boris Petrov for Indian EEZ survey and mapping.
 2010: Chief Scientist in ORV Sagar Kanya (SK 273) for Indian EEZ survey and mapping.
 2010: Chief Scientist in ORV SK 275 for Indian EEZ survey and mapping.
 2011: Chief Scientist in ORV SK 286 for Indian EEZ survey and mapping.
 2012: Chief Scientist in ORV SK 292 for Indian EEZ survey and mapping.
 2012: Chief Scientist in ORV SK 299 for hydrothermal studies.

2012: Chief Scientist in Akademik Nikolay Strakhov for hydrothermal studies.

2015: Member of the 34th Indian Scientific Expedition to Antarctica.

2020: Member of the 11th Indian Scientific Expedition to Southern Ocean.

Research/Project Experience

Current international projects:

- **Project 9:** Drivers and Effects of Fluctuations in Sea Ice in the Antarctic (DEFIANT). Funding Institution: British Antarctic Survey (Cambridge, United Kingdom), Natural Environment Research Council-DEFIANT NE/W004747/1. This project is aimed to foster collaborative efforts and enhance step change understanding of the factors influencing fluctuations in sea ice within the Antarctic region.
- **Project 8:** Ocean observations and indicators for climate and assessments (ObsSea4Clim). The project was sanctioned by MoES (MoES/EU/Horizon Europe/1/2022-PC) and the European Union (EU) on 05/04/2024 to improve sustained and multipurpose observations vital to European and global climate requirements.

Previous projects:

- **Project 7:** Variability of remote sensing reflectance of the waters around Antarctic continent–implications to retrieval of chlorophyll-a from an optical sensor for studying biogeochemical cycle in the high latitude waters. **Role:** Principal Investigator. Participated in scientific expedition to Antarctica.
- **Project 6:** Hydrothermal mineralization study in the Indian Ocean. **Role:** Chief Scientist for carrying out scientific operations for exploration of seafloor massive hydrothermal sulfide ore deposits in the Central Indian Ridge and South-west Indian Ridge.
- **Project 5:** Swath bathymetric multibeam survey and mapping of the exclusive economic zone of India. **Role:** Chief Scientist for cruise/survey planning, data acquisition, processing, quality evaluation, map preparation and interpretation of seabed morphology/ Bathymetry retrieval from satellite altimeter.
- **Project 4:** Development of marine geo-scientific database (MGSDb) at NCPOR. **Role:** Overall coordination.
- **Project 3:** Generation of Ocean color and mixed layer primary production climatic atlas over the North Indian Ocean using IRS-P4 (OCM) data. **Role:** Processed entire mission record of IRS-P4 OCM-1 for chlorophyll-a and ocean primary production atlas generation.
- **Project 2:** Synergistic study of AVHRR SST and IRS-P4 OCM chlorophyll for generation of integrated PFZ forecast. **Role:** Cruise participation for collection of in-situ bio-optical data, evaluation of bio-optical models, development of algorithms for retrieval of biophysical parameters from satellite data.
- **Project 1:** Retrieval and validation of geophysical parameters from IRS-P4 (MSMR) for studying climatic anomalies of the north Indian Ocean. **Role:** Development of algorithms for retrieval and

validation of SST and wind from IRS-P4 (MSMR).

Recognised Ph.D guide

- Mangalore University
- Bharathidasan University
- Pune University

Other important contributions

- (a) Research guidance : 03 (Ph. D pursuing), 26 (M. Sc/M. Tech completed)
- (b) Acted as reviewer for : 11 Journals
- (c) Total no. of field/sea-going days for in-situ data collection : ~540 days (Participated in various cruises onboard MV Ivan Papanin, ORV-Sagar Kanya, Akademik Boris Petrov, Sagar Poorvi, Sagar Paschim, SA Agulhas).
- (d) Coordinated two sessions in National Conference on Polar Sciences, one session in "36th IGC: A Unique Opportunity for advancement in Geo-sciences", three sessions in International Indian Ocean Science Conference (IIOSC) 2022. A session convenor in SCAR 2022.
- (e) Member of various committees on: Procurement of scientific instruments, Recruitment of Research Scientist, Tender committee meetings.

Software Skills*

Programming skills : IDL, EML Scripting, CDO, GRADS.
Image Processing/GIS : ArcGIS, ERDAS Imagine, ENVI, SeaDas, CARIS HIPS/SIPS, Fledermaus.
Statistical packages : GRADS, ODV, Statistica, Minitab, SPSS, Surfer, Grapher, Tecplot

** Excellent experience in sea-ice, thermal & ocean color data analysis.*

Place: Vaso-da-gama, Goa, India

(Dr. Babula Jena)

Date: